

having no definite point of attack for treating the condition we fall back on the selective atrophying action of the x-ray with its possible "harmful potentialities."

The chief underlying factor of the acne picture is an hypertrophy and hypersecretion of the pilosebaceous glands occurring at the time of puberty, a period when gland growth and secretion are most pronounced. We can fairly well rule out the results produced on the plugged duct of the sebaceous gland by the acne bacillus and the staphylococcus, as the former can be demonstrated in the sound ducts on the lateral aspects of any greasy nose, and although present in abundance, fail to produce an acne condition; and the staphylococcus is found only in those lesions where an abscess formation has occurred in the mass of detritus with which the enlarged duct is blocked, many of the lesions remaining in a comedone stage and progressing no further. Control of this pustular or abscess type of lesion was the curative rôle played by the vaccine therapy, no effect being produced on the comedone.

Diet, or rather faulty diet, with lack of balance in starch and sugar, can and does exaggerate an attack, but while its correction is of assistance in the treatment of the disease, we see many patients suffering from an excessive ingestion of carbohydrates without skin infections, and hyperglycemia, although fairly constant, does not occur in all cases.

Thyroid dysfunction has been found associated as a frequent feature of puberty, but, although mentioned by several authors on acne, no study has been made of its causative rôle, but the possibility of a glandular dysfunction as an underlying etiology sounds at least possible at the present time.

✱

GEORGE H. BECKER, M. D. (240 Stockton Street, San Francisco)—Doctor Chipman's contribution should be received with keen appreciation by the general profession. In this advanced age, it is indeed a pleasure to have an author propose a "simple view and a simple treatment" of any problem.

The acne problem, although belonging entirely to the field of the dermatologist is perhaps more often presented to the general physician for solution. This is specially true of the less aggravated cases.

In view of our continued ignorance of the etiology, although we have endeavored to class it as infectious, metabolic or endocrine, the writer has advisedly refrained from any elaborate constitutional therapy. To be sure, in this as in other diseases, any pathological conditions found must be corrected according to the principles of general medicine.

I have always felt that we must focus our attention upon the local treatment. Remembering that the local condition is one of hypersecretion of the pilosebaceous glands and a resultant plugging of the ducts, with subsequent bacterial infection, our initial aim should be for drainage. Doctor Chipman has ably enumerated the methods used to bring this about. I am glad to see him place soap and water in a position of importance along with the keratolytics. I have always used alkaline soaps and hot water, invariably followed by cold water. The pustules must be treated surgically. Persistency in thus relieving the condition often brings satisfactory results.

For the more aggravated cases the cause must be treated. It is in these cases that our latest ally, the x-ray, is of the greatest help in diminishing the glandular activity.

Doctor Chipman has given us a very practical paper.

✱

HOWARD MORROW, M. D. (384 Post Street, San Francisco)—Doctor Chipman has given us a sane regimen for the treatment of acne based on his many years of experience. In general it is about the same procedure that we follow. After correcting outspoken indiscretions in diet or mode of living, we have our patients use a bichloride of mercury and resorcin lotion well rubbed over the areas twice daily and give them fractional x-ray therapy every two weeks for six treat-

ments. At the time of each visit we empty all pustules and express as many comedones as possible. If the comedones are thoroughly removed it is of great value, but if only the upper half of the comedone is removed and the surrounding skin is traumatized in the process a pustule is sure to result.

The care of the scalp in patients with acne is of importance. If there is considerable scurf or dandruff and it is not controlled the acne is almost certain to recur.

✱

AUTHOR (closing)—One point may be emphasized in closing this discussion: the distinction between the juvenile and the adult types of acne. In the latter the seborrheic status is of relatively little consequence, while in the former its importance is paramount. I believe the failure to differentiate these types is responsible for the wide divergence of views concerning treatment. It will add to the clarity of the subject if this distinction can be uniformly made.

METALLIC TINKLES IN PNEUMOTHORAX*

By AUDLEY O. SANDERS, M. D.

Livermore

DISCUSSION by Chesley Bush, M. D., *Livermore*; Philip King Brown, M. D., *San Francisco*; Charles C. Browning, M. D., *Los Angeles*.

TEXTBOOKS on physical diagnosis have made comparatively few changes in their sections on pneumothorax during the past twenty-five years, notwithstanding the advent of a new phase of the condition, that of induced or closed pneumothorax as distinct from accidental, open pneumothorax which comprised the cases on which the earlier observations were made.

With the many thousands of cases of induced pneumothorax and the long-continued, careful observations made in the course of pneumothorax treatment in recent years, it would appear that the old problems of physical signs and their interpretation should have long since been clarified.

As an example of a common sign with varied interpretations, the metallic tinkle is here presented. All textbooks list this as one of the important signs in pneumothorax. But when the important question as to what intrathoracic conditions are necessary for the production of this sign there appears to have been little added since the very lucid discussions of Laennec and his contemporaries of a hundred years ago.

DIAGNOSTIC SIGNIFICANCE AND CAUSES OF METALLIC TINKLES

Textbooks¹ continue to give the metallic tinkle as diagnostic of Laennec's triple lesion: (1) pneumothorax or pulmonary cavity with (2) open bronchus and (3) fluid or effusion.² This was questioned by Williams, an English contemporary of Laennec. In 1842 Williams wrote, "The conditions are not, as Laennec supposed, essential to metallic tinkle production. . . . We have heard metallic tinkling accompany both voice and cough in a case of pneumothorax without liquid effusion or perforation of the pleura."³

In the light of the observations of recent years on cases under pneumothorax treatment, with

* Read before the Alameda County Medical Society, September 16, 1925.

neither open bronchi nor demonstrable fluid, can the interpretation of the metallic tinkle, as diagnostic of the triple lesion, continue to be accepted?

Laennec explained that the metallic tinkle could be caused by air from an open bronchus vibrating over fluid in a pneumothorax or pulmonary cavity. He also spoke of the "falling drop" as a possible means of tinkle production in such a cavity.⁴ However, there is still dispute in textbooks as to the mechanism of the tinkle production.⁵ Is the tinkle produced by (a) the vibration of air over fluid in a pneumothorax or pulmonary cavity, (b) the "falling drop," (c) the breaking of an air bubble through mucus of an open bronchus into an air cavity, (d) an air bubble from an open bronchus ascending through an effusion, or (e) by the amphoric echoing of râles produced in diseased tissue near a pneumothorax or pulmonary cavity?⁶

May it not well be, as Doctor Gee has stated,⁷ that each of these explanations is correct in particular, individual cases? May it not be that a sound of a certain quality and pitch, no matter how produced, will assume a metallic, tinkling character, if released into a pneumothorax or pulmonary cavity with proper conditions of walls and of air pressure? Some of the older authors⁸ even warned of the possibility of mistaking the metallic tinkles over a gas-distended stomach for those of a pneumothorax.

AN ANALYSIS OF FORTY-FOUR CASES OF PNEUMOTHORAX

Below are presented observations of the writer on forty-four cases of pneumothorax. Most of these patients were observed by the writer over periods varying from two to eighteen months, frequent, careful physical examinations being made during these periods. X-ray examinations were also made on practically every patient at approximately the same date as the physical examination.

TABLE I—*Ten Cases of Accidental Pneumothorax (With Possibility of Open Bronchi)*

In five cases with demonstrated fluid, metallic tinkles were heard.

In three cases with demonstrated fluid, no metallic tinkles were heard.

In one case with no demonstrable fluid, metallic tinkles were heard.

In one case with no demonstrable fluid, no metallic tinkles were heard.

TABLE II—*Thirty-Four Cases of Induced Pneumothorax (With Closed Pleural Cavities)*

In eight cases with demonstrated fluid, metallic tinkles were heard.

In four cases with demonstrated fluid, no metallic tinkles were heard.

In sixteen cases with no demonstrable fluid, metallic tinkles were heard.

In eight cases with no demonstrable fluid, no metallic tinkles were heard.

It will be noted that two cases were reported twice. In one of these cases tinkles were heard though no fluid could be demonstrated by x-ray or physical examination. Some months later fluid

developed, but tinkles were no longer heard. In the other case tinkles were heard for several months, though no fluid could be demonstrated by x-ray or physical examination. With the later development of fluid the tinkles persisted.

In the cases recorded above, metallic tinkles were noted with gradations from very fine and faint to those distinctly bell-like. Findings were practically never exactly the same at two consecutive examinations.

In one case of accidental, complete pneumothorax of the left side with no fluid, the clear bell tones were exactly synchronous with the beats of the patient's heart. There could be no question that the sounds were originated by the heart movement.

In another case an accidental, partial pneumothorax with fluid, medium râles over the second interspace changed to distinct, clear, metallic tinkles as the patient changed position, the bell of the stethoscope being held in place as the patient's position was changed. As the patient slowly returned to his first position the metallic quality was lost. This procedure was repeated at intervals during the examination. On other examinations of this patient, no tinkles were noted.

In several cases of induced, partial pneumothorax, further collapse being prevented by firm, pleural adhesions, over extensive lung lesions at the apex, typical, moist râles were heard over the adherent, diseased lung, and, as the stethoscope bell was moved off the margin of the adherent lung, the râles could still be heard, more faintly but with an added amphoric or metallic quality. As the stethoscope bell was advanced gradually away from the adherent lung and over the pneumothorax cavity, these sounds became unmistakable, faint, metallic tinkles.

CONCLUSIONS

1. It would appear from the findings noted in the forty-four cases of pneumothorax here reported that the metallic tinkle in pneumothorax is not confined to those cases with open bronchus and effusion. Metallic tinkles were heard in cases of induced pneumothorax with neither fluid nor open bronchus.

2. It would also appear that metallic tinkles may be produced by sounds arising from distinctly varied sources.

U. S. Veterans' Hospital No. 102.

REFERENCES

1. Norris, G. W., and Landis, H. R. M.: Diseases of the Chest and the Principles of Physical Diagnosis, third edition, W. B. Saunders Co., 1924, p. 137.
2. Hale-White, Sir William: Selected Passages from De l'Auscultation Médiate (first edition) by R. Théophile H. Laennec. William Wood & Co., 1923, p. 179.
3. Williams, Charles J. B.: Library of Practical Medicine, Vol. 2. Lea and Blanchard, Philadelphia, 1842, p. 328.
4. Hale-White, Sir William: Selected passages from De l'Auscultation Médiate (first edition) by R. Théophile H. Laennec. William Wood & Co., 1923, p. 179-80.
5. Fishberg, Maurice: Pulmonary Tuberculosis, second edition, 1919, p. 465. Rose, W. D.: Physical

Diagnosis, third edition, C. W. Mosby Co., 1922, p. 167-68. Cabot, Richard C.: *Physical Diagnosis*, eighth edition, 1924, p. 170. Norris, G. W., and Landis, H. R. M.: *Diseases of the Chest and the Principles of Physical Diagnosis*, third edition, W. B. Saunders Co., 1924, p. 137. Bushnell, George E., and Pratt, Joseph H.: *Physical Diagnosis of Disease of the Chest*. W. B. Saunders Co., 1925, p. 154.

6. Osler, William: *Practice of Medicine*, seventh edition, 1909, p. 331 and 659. Cabot, Richard C.: *Physical Diagnosis*, fourth edition, 1909, p. 170. Fishberg, Maurice: *Pulmonary Tuberculosis*, second edition, 1919, p. 465. Bushnell, George E., and Pratt, Joseph H.: *Physical Diagnosis of Diseases of the Chest*. W. B. Saunders Co., 1925, p. 57 and 154.

7. Gee, Samuel: *Auscultation and Percussion*, Oxford Medical Publications, London, 1907, p. 131.

8. Williams, Charles J. B.: *Library of Practical Medicine*, Vol. 2. Lea and Blanchard, Philadelphia, 1842, p. 328. Watson, Thomas: *Practice of Physic*. Lea and Blanchard, Philadelphia, 1844, p. 529. Haughton, —: *Cyclopedia of Practical Medicine*. Lea and Blanchard, Philadelphia, 1845, p. 649. Flint, Austin: *Manual of Auscultation*, fourth edition. Lea Brothers & Co., Philadelphia, 1885, p. 138.

DISCUSSION

CHESLEY BUSH, M.D. (Arroyo Sanatorium, Livermore)—It is high time that someone should begin to question the interpretation of certain physical findings in the chest. Textbooks have a habit of copying each other until certain statements are accepted as traditions without further investigation. Metallic tinkle is a case in point. At best we can but speculate as to the cause of this distinctive physical finding; but since the advent of artificial pneumothorax and the roentgen ray we should have considerable more basis for speculation than did Laennec one hundred years ago.

Doctor Sanders' careful work is to be commended. He has shown that Laennec's so-called triple lesion—(1) air, (2) open bronchus, (3) fluid—need not exist in all three components to produce metallic tinkle. He has shown that fluid need not be present. This is in direct contradiction to textbook explanation of Norris and Landis, who show that air must bubble through fluid to produce the tinkle in bottles. We have set up this apparatus and found that in bottles such is actually the case, but we do not believe that the bottle experiment parallels conditions in the chest.

On the very day that Doctor Sanders' paper was sent to me for comment Doctor Brier, of this sanatorium, demonstrated to me beautiful metallic tinkles in a case of artificial pneumothorax without any evidence of fluid, either by physical examination or by fluoroscope. There was reason, however, to believe that an open bronchus existed on account of the excess air in the chest. It has been my experience in the past with artificial pneumothorax that metallic tinkles were never heard except in those cases where an open bronchus existed; and of course the majority of those cases also had fluid. I have never heard them in an uncomplicated artificial pneumothorax without fluid.

We must conclude that demonstrable fluid is not necessary for the production of metallic tinkles, but hold an open mind as to the exact method or methods of their production.

✱

PHILIP KING BROWN, M.D. (909 Hyde Street, San Francisco)—Doctor Sanders has made an important criticism and contribution, for it is quite true that physical examination of a chest once invaded by air introduced into the pleural cavity for therapeutic purposes alters conditions in a way that requires new valuation of old symptoms. Pleural signs closely resembling fine dry râles, increased by cough and the varying signs over an artificial pneumothorax, are in need of explanation. Doctor Sanders has made quite

clear under what varying conditions tinkle can occur, and his observations on the production of the tinkle synchronous with heart heat are especially important.

It has seemed to me that one determining factor is tension, and in cases of marked rigidity of the mediastinum tinkle was more apt to occur. As Doctor Bush points out, the bottle experiment is not the same thing, but it does illustrate transmission of tinkling sound under conditions of rigidity of the wall. The change in sound with change in position may have an explanation in the same change in tension.

✱

CHARLES C. BROWNING, M.D. (711 Merritt Building, Los Angeles)—I have not collected in tabulated form data of the cases which have come under my observation in which I have found metallic tinkles in pneumothorax. The cases which he reports of accidental pneumothorax and the number of cases in which metallic tinkles were heard with and without fluid, and also the report in the second table of induced pneumothorax, are exceedingly interesting. I have met cases reported in each of these classes.

In reply to his inquiry if it "may not well be, as Doctor Gee has stated, that each of these explanations is correct in particular, individual cases?" In my judgment, yes. I would also make the same answer to the question immediately following, "May it not be that a sound of a certain quality and pitch, no matter how produced, will assume a metallic, tinkling character if released into a pneumothorax or pulmonary cavity with proper conditions of walls and of air pressure?"

I also concur in his conclusions.

Accepting the statement (physical diagnosis of diseases of the chest, Pratt and Bushnell) that, "All normal respiratory sound is caused by the air streaming through the rima glottidis. . . . The sound (vesicular) that is heard over the lungs is fundamentally the laryngeal sound amplified by the thorax as a resonator. . . . Bronchial sound likewise is produced in the larynx. It is amplified in the bronchi, which act as resonators for sounds of higher pitch than that of vesicular sounds, I would add."

Changed conditions may modify these sounds in transit, and these changes may be transmitted with corresponding modifications to the respective resonators, the thorax, and bronchi. One of the more common changes is in the amount and character of moisture in the bronchial tubes. The more viscid fluids give a greater variety of sounds, which are spoken of as amphoric, musical, metallic, etc. The peculiar character of these sounds is transmitted to the chest wall amplified by the resonators.

During the existence of pneumothorax many of the bronchi are not receiving the ordinary amount of air. However, if one has become patent and allowed air to escape into the pleural cavity it remains a good conductor of sound and the air passing through this will conduct sound which may have been occasioned at any point within the bronchial tube and not only at the point where the air enters the pleural cavity. The thorax containing air under the condition of pneumothorax acts as a resonator for sounds thus received. This will occur through moisture in the bronchial tubes, of a proper quantity and consistency. It is conceivable that a cavity which has been compressed may lie sufficiently near the pleura as to transmit sounds, and that air entering such cavity or passing through a bronchus containing proper fluid may produce sounds which may be amplified by the resonators.

I have made demonstrations by the use of a soft rubber bottle and a system of tubes controlled with an air pump which I believe justify me in the conclusion, that sounds originating at a distance from the site of the pneumothorax may produce tinkle sounds which may be transmitted to this site, on the principle of a speaking tube. I have produced tinkle sounds at eight inches distance which seemed as distinct as

those produced at two inches. I have not thought this work was of sufficient importance to justify me in reporting it. It has, however, given me a conception of the variable conditions which may result in the production of metallic tinkle in relation to pneumothorax.

✽

DOCTOR SANDERS (closing)—I think the gentlemen who have so kindly discussed this paper agree with me in the belief that the world has had but one Laennec; that, in all probability, the world will never have another such genius in physical diagnosis; and, were he living today, that he would be of the first to question any outworn formula.

TONSILLECTOMY WITH NITROUS OXID-OXYGEN ANESTHESIA *

By MERTON PRICE, M. D.

San Francisco

DURING the past five years tonsillectomy under nitrous oxid-oxygen has become an accomplished fact. Apparently unacquainted with the work of McKesson and J. H. Evans, most of the laity and a goodly percentage of the medical profession still view this procedure as a surgical innovation.

Owing to the frequent demands for the removal of children's tonsils under some method other than ether narcosis, we have attempted at the Children's Hospital, San Francisco, to develop a nitrous oxid-oxygen technique. We have made this operation, not a matter of routine, but of selection. In most cases there has been definite pathology calling for the removal of the tonsils and the exclusion of ether anesthesia. These pathological conditions have been nephritis, septicemia, mastoiditis, acidosis, bronchitis (acute and chronic), osseous tuberculosis, tuberculous adenitis, and pulmonary tuberculosis.

ADVANTAGES

There are certain advantages obtainable under nitrous oxid-oxygen anesthetic. The induction period is greatly reduced (two to four minutes). Under ether, fifteen to twenty minutes is not unusual. The spasm of coughing, retching and vomiting, attendant upon the spraying of ether vapor upon the pharynx, is noticeably absent. The surgeon is not hampered by the excessive inhalation of ether. He is not required to regulate his own respirations nor to wear an unusual shield. Many oral surgeons find it necessary to wear grotesque gas masks to avoid a chronic ether bronchitis.

While the laryngeal reflexes are relatively difficult to abolish under nitrous oxid-oxygen, this is not an obstacle but an aid to the surgeon who insists upon a light anesthesia.

The pharyngeal and laryngeal reflexes may be entirely suppressed under nitrous oxid-oxygen. Such deep anesthesia is not only unnecessary, but most undesirable. There is a certain element of safety in a partially active laryngeal reflex. Under ether anesthesia there is a decided irritation of the pharyngeal and laryngeal mucosa, with its resultant excess

secretions and interruption of the anesthesia. These disagreeable features are entirely eliminated under nitrous oxid-oxygen anesthesia. There is little or no mucus present, and the operator is working in a clear, dry field. By lowering the table and using suction the anesthetist can prevent the blood and serum from entering the esophagus and larynx. A few moments after the completion of the operation the patient is awake, in possession of all his faculties, and able to cooperate. This usually prevents swallowing of blood and thereby eliminates nausea and vomiting.

The usual parents' question is, "How long will it be before the child is awake and able to talk?" With nitrous oxid-oxygen narcosis, the parents welcome to the room a conscious child, and their hours of suspense are ended. This is a joy and triumph for the anesthetist and surgeon.

DISADVANTAGES

The disadvantages are entirely upon the shoulders of the anesthetists. The physician must be cognizant of the depth of the patient's narcosis at all times. Pupillary reactions, phonation, muscular contractions, cyanosis, pulse, blood pressure, and respiratory rhythm must be given their true values and immediately interpreted. Cyanosis does not always mean a deep analgesia, nor does a cry mean the reverse. A moaning child may be profoundly unconscious. On account of the rapid action and quick elimination of the gas there is occasionally some difficulty in holding the patient at the same level of narcosis. This apparent objection can be overcome by a mutual cooperation of the anesthetist and operator.

It is unfair to ask graduate nurses and inexperienced physician anesthetists to attempt this work. It is a specialty, and calls for profound knowledge, alertness and judgment obtained only through experience.

We feel that the age of the patient has no influence on the anesthetic. The youngest patient was 6 months, and the oldest 52 years of age.

The amount of bleeding is the same as under ether. There is an occasional darkening of the blood which at first may be disquieting to the operator. This cyanosis is usually transient. Any bleeding points may be easily clamped and ligated. Suturing and dissecting of scar tissue are readily performed.

There seems to be little or no change of the blood pressure. McKesson states that nitrous oxid-oxygen may be administered in any operation which is comparatively free of other shock-producing factors for two hours without a material change in either systolic or diastolic pressure. This has been our experience. At the end of the operation the blood pressure returns to normal or slightly below normal. A properly administered nitrous oxid-oxygen anesthesia produces little or no change in the blood pressure.

The preoperative routine consists of a general physical examination of the patient and a laboratory examination of the urine and blood, with the bleeding and coagulation time. No food or liquids are given the morning of the operation. Divided doses of morphin sulphate and atropin are given

* Read before the Anesthesiology Section, California Medical Association, at the Fifty-Sixth Annual Session, Los Angeles, April 25-28, 1927.